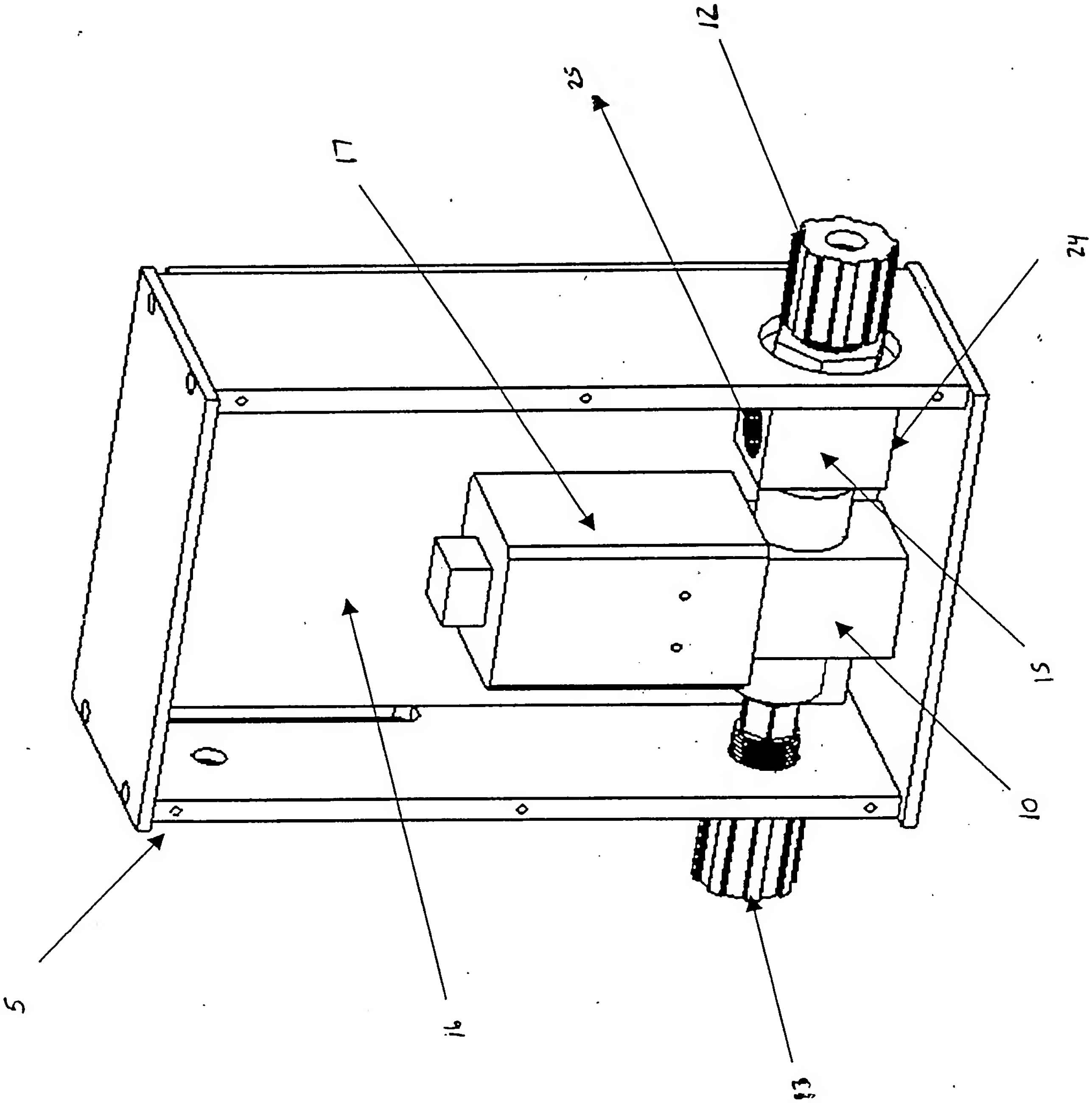
FIG. 1



Concentric venturi

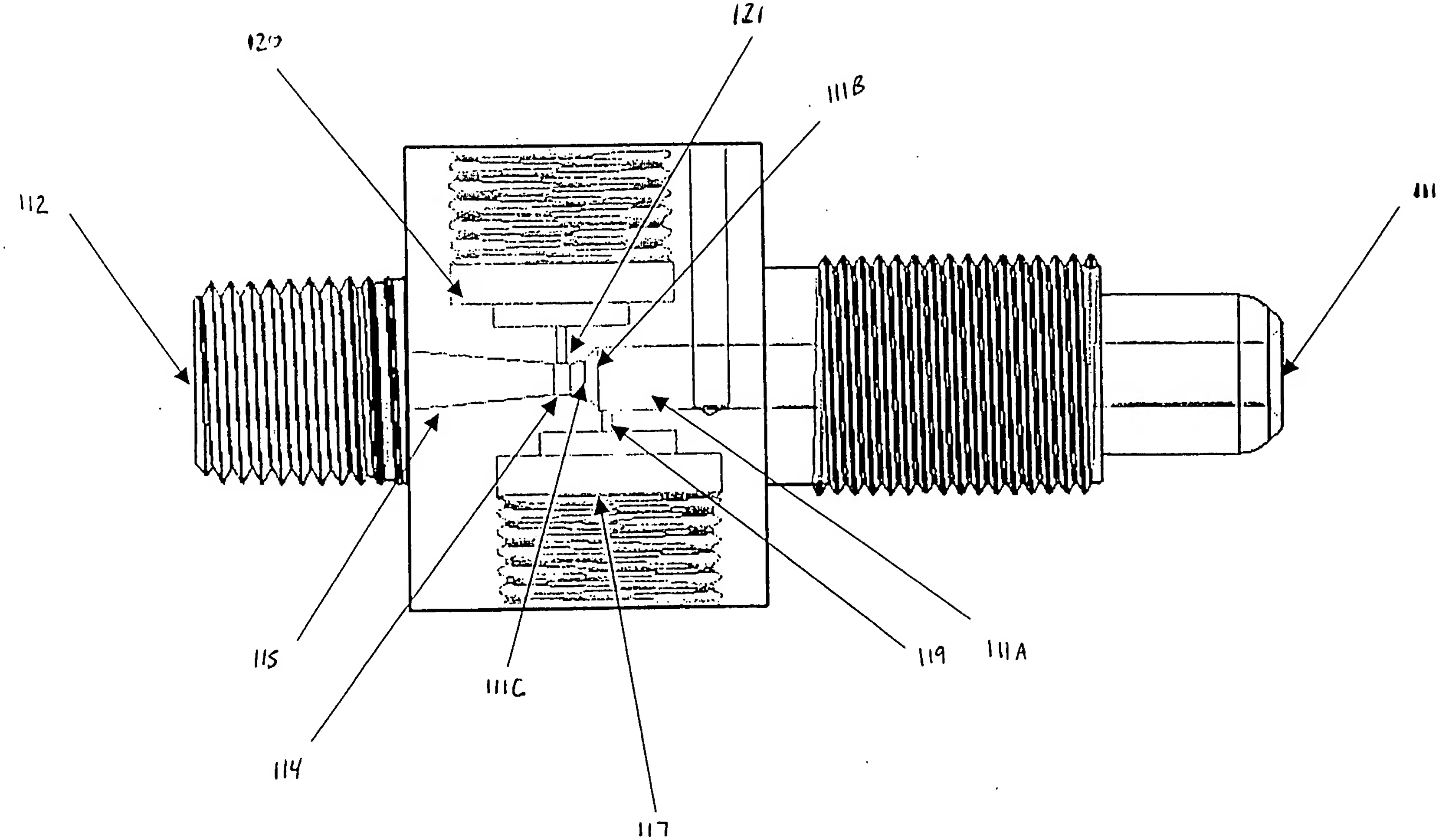


FIG. 2

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Concentric venturi

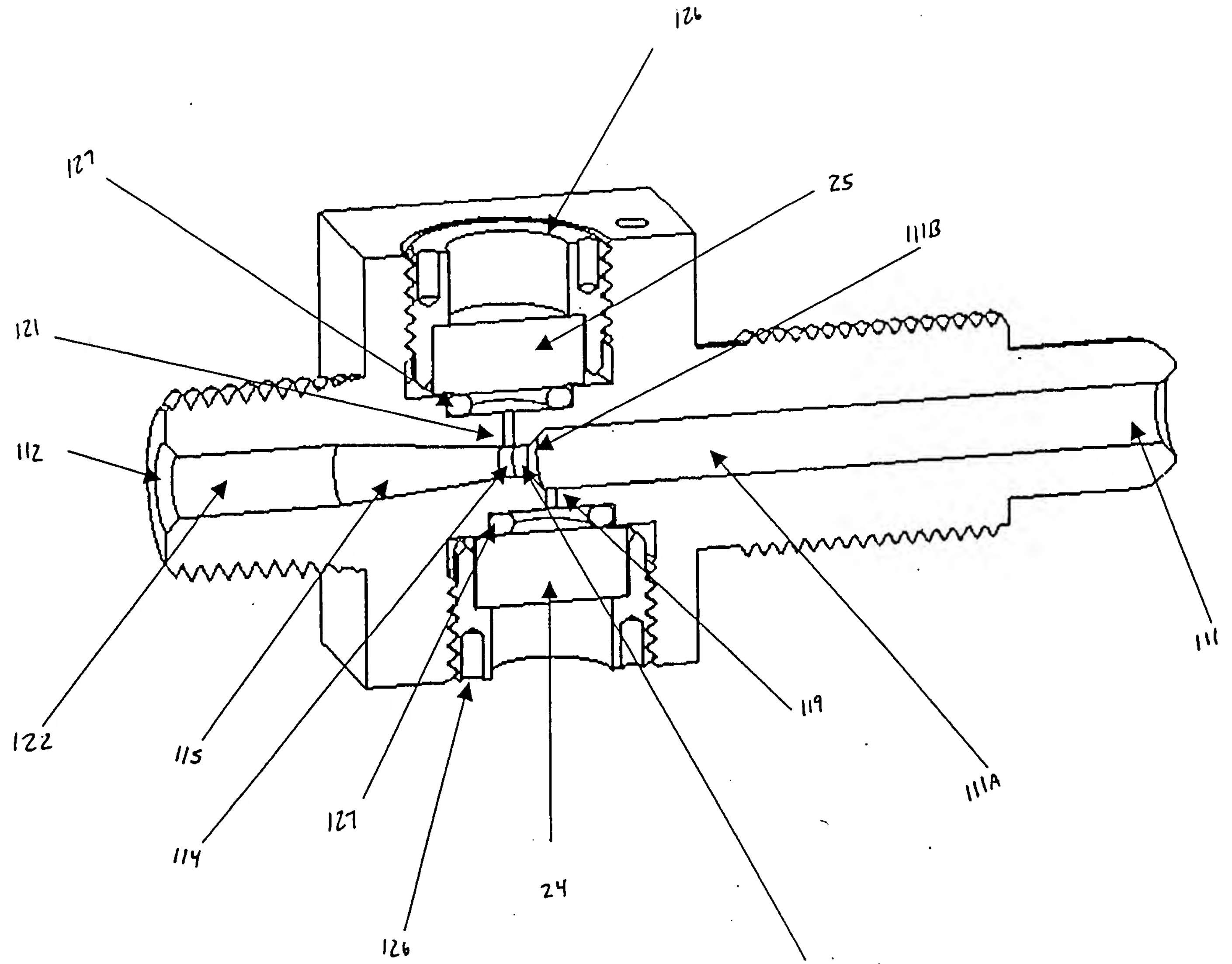

FIG. 3

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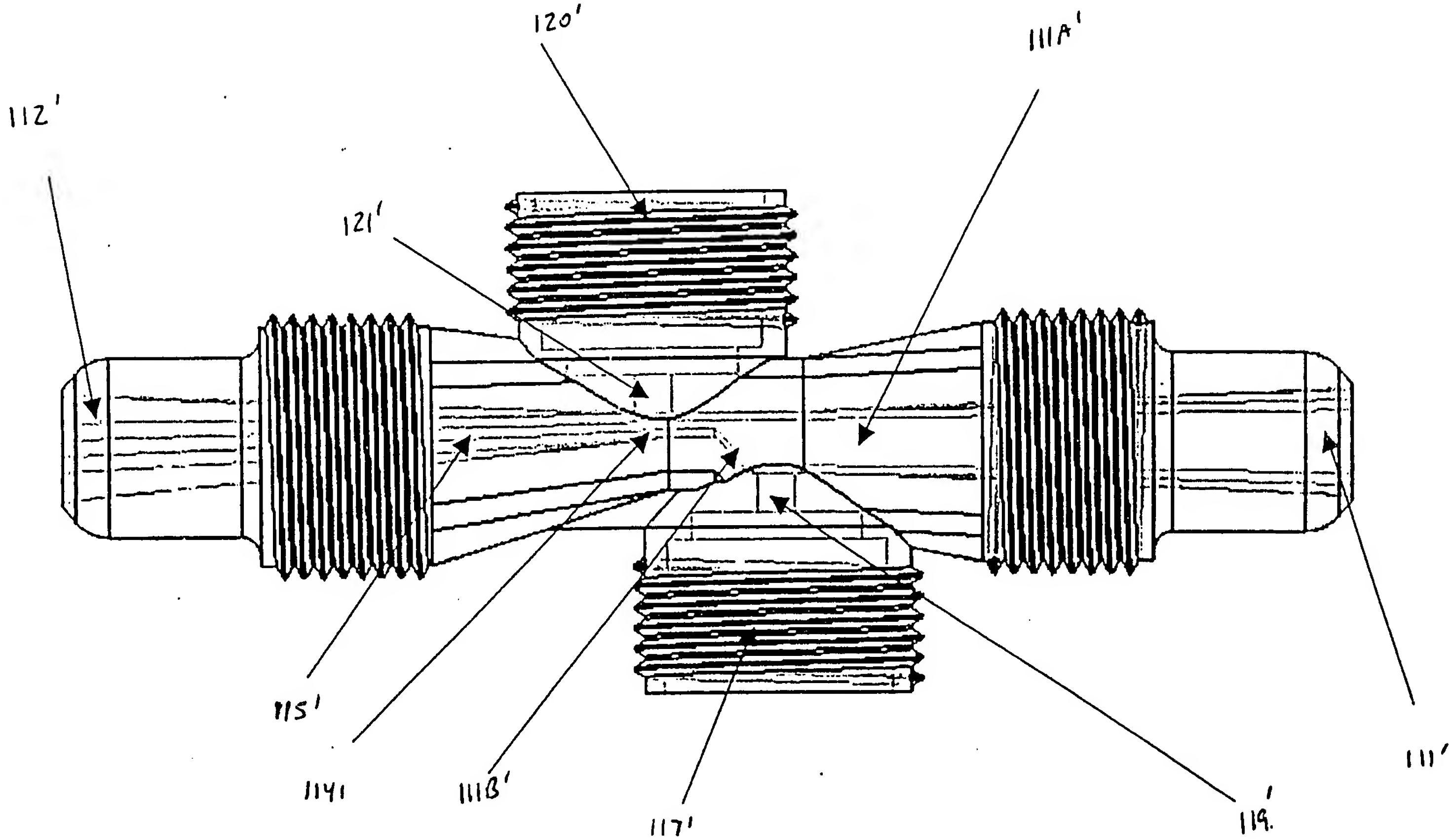
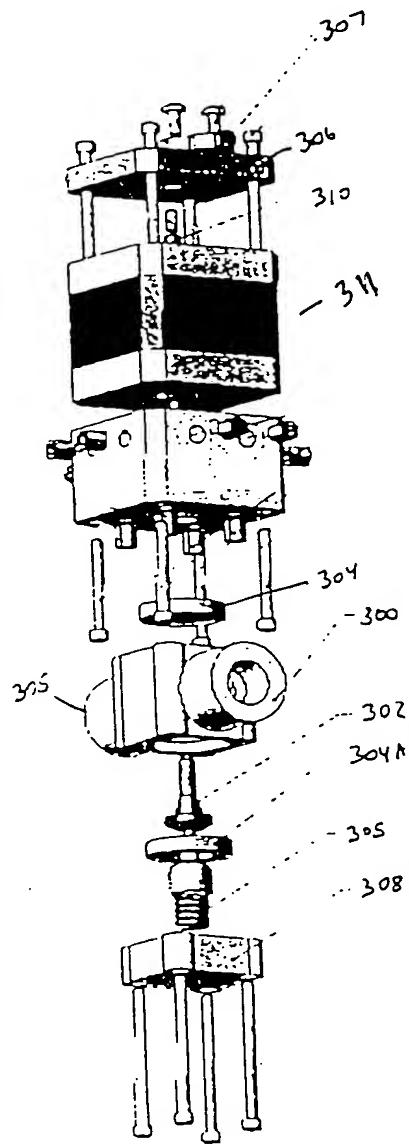


Eccentric flat channel venturi

FIG. 4

Fig. 5



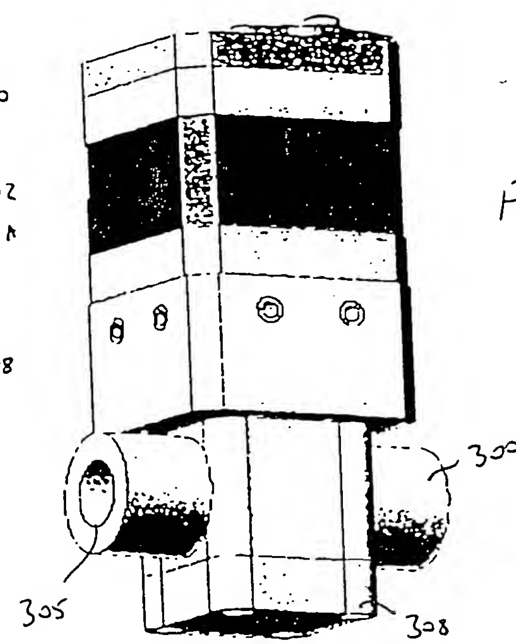


Fig. 6

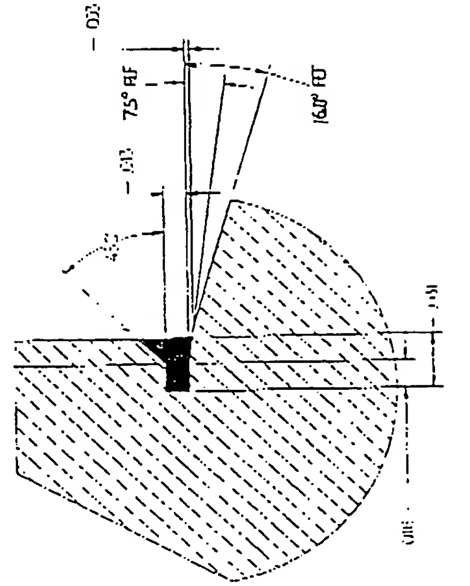


FIG. 7A

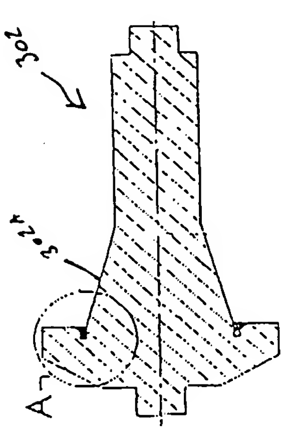


FIG. 7

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FIG. 8

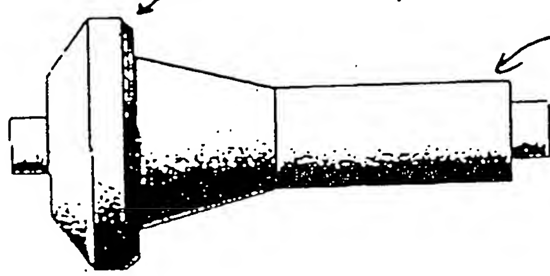

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Fig. 9

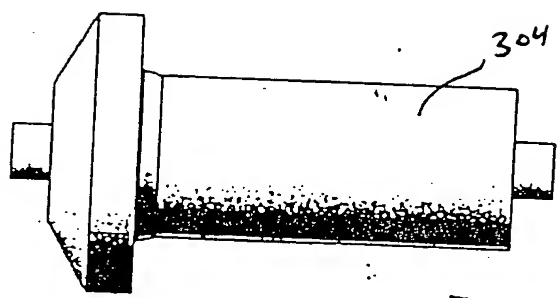
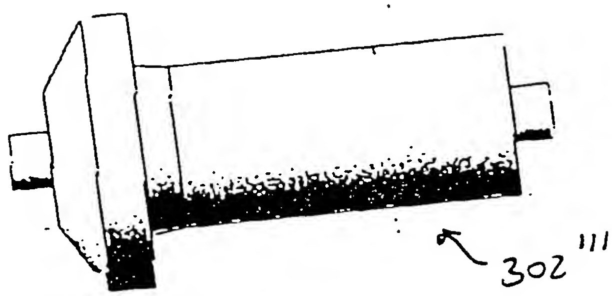


FIG. 10



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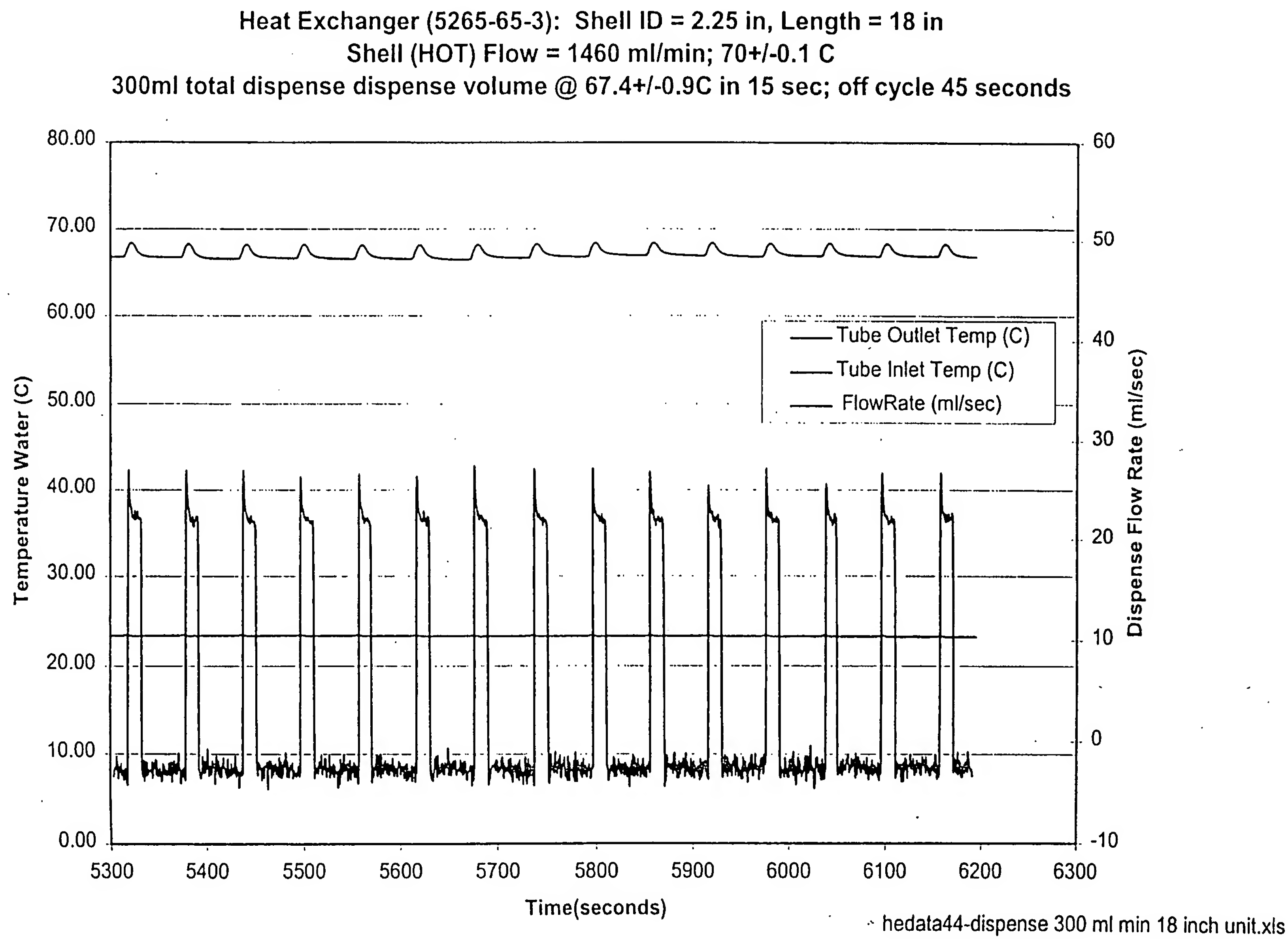

FIGURE 11

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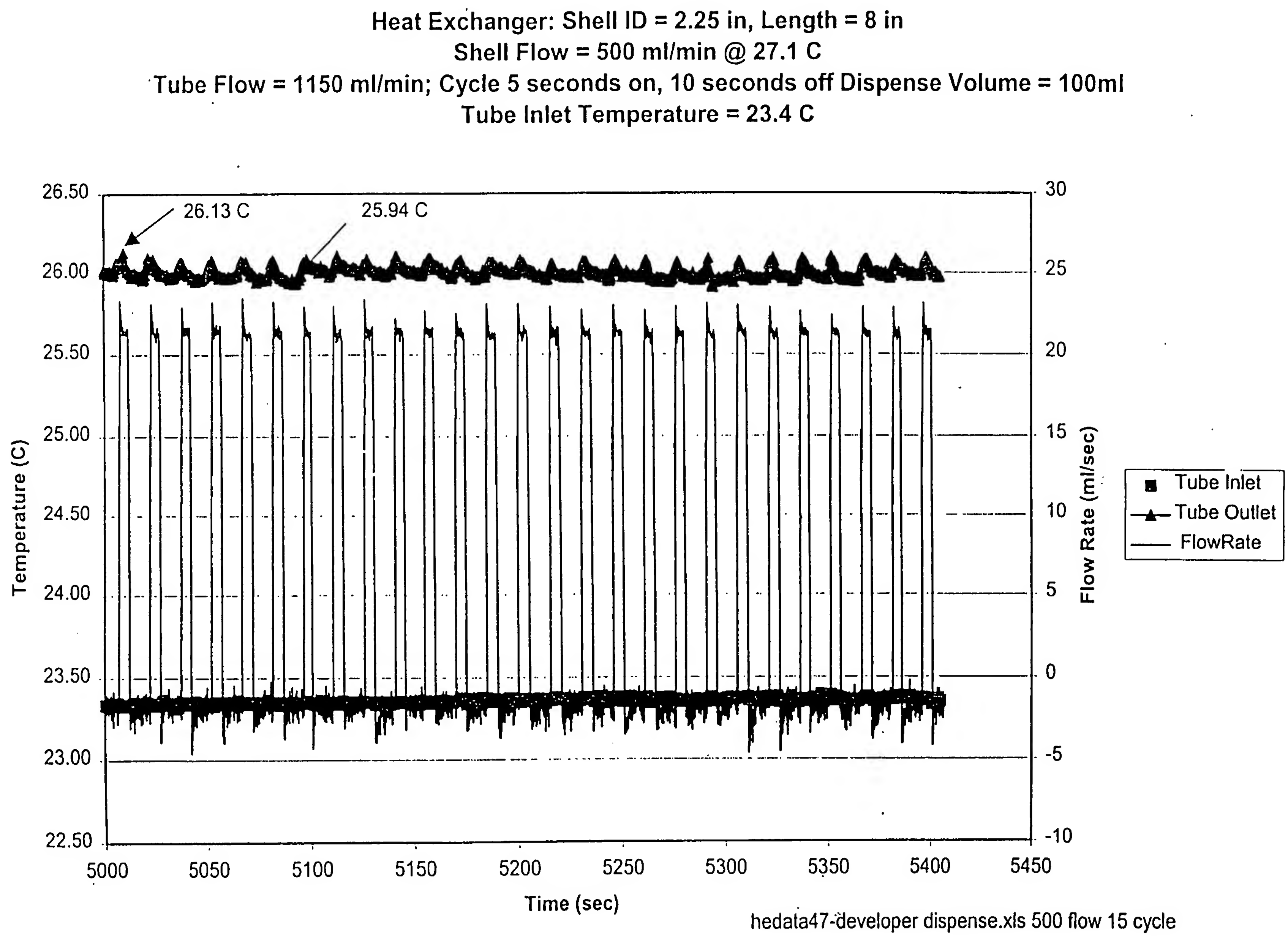

FIGURE 12

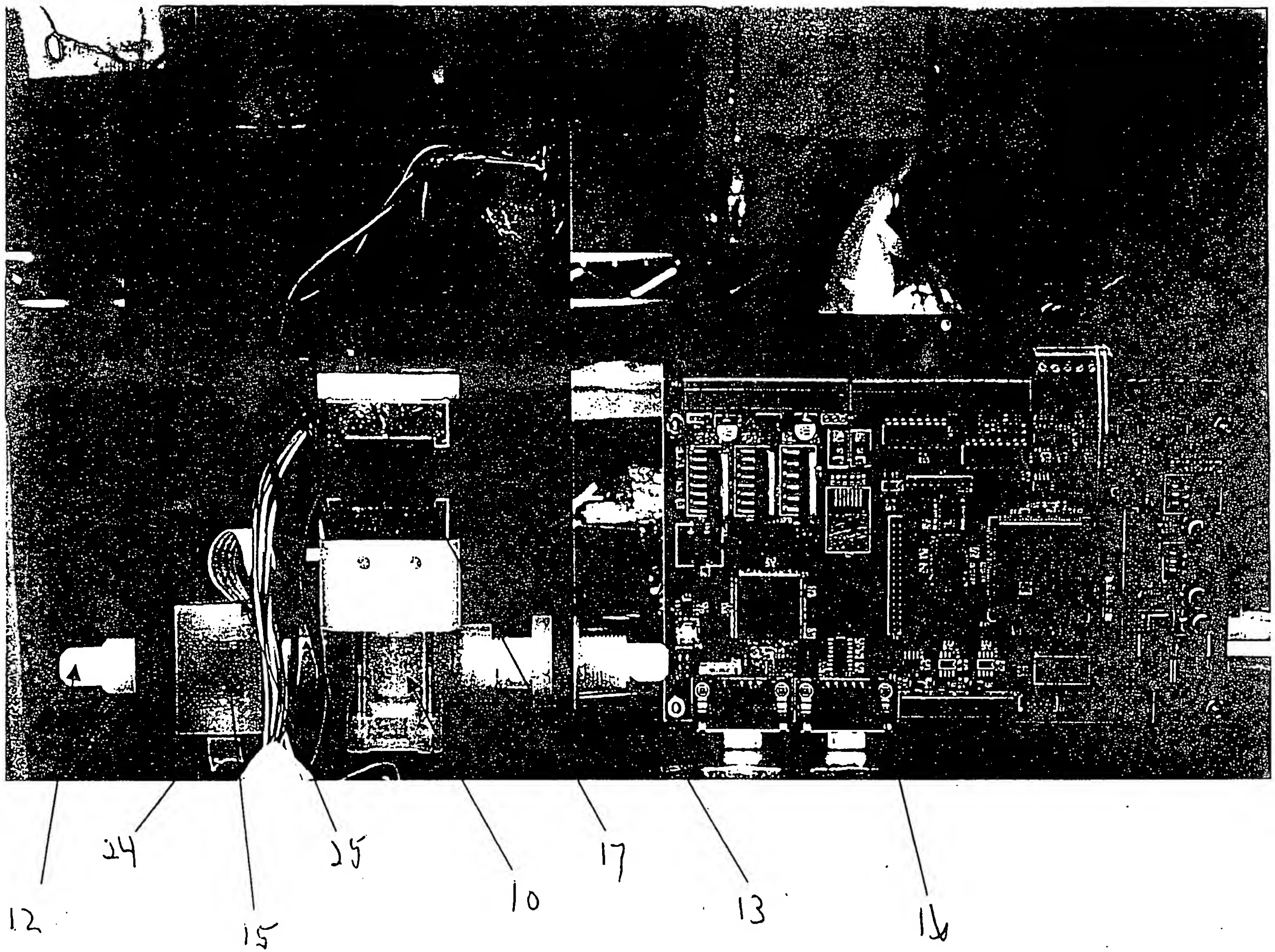

Figure 13

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Flute #1
0711flute1flow.xls

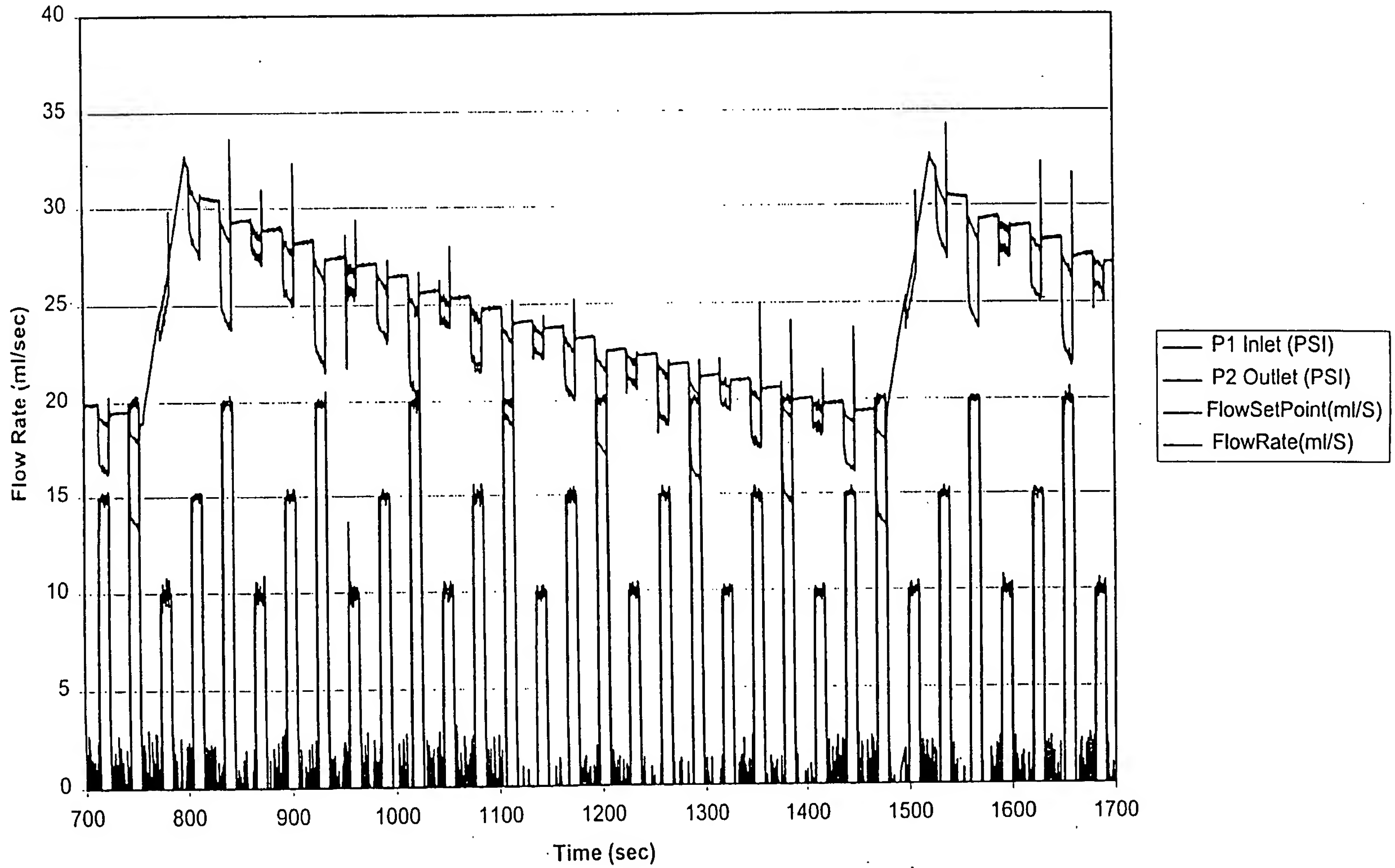

FIGURE 14

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FLUTE 6UVT2 (1/4") VOLUMETRIC FLOW RATE vs PRESSURE DROP

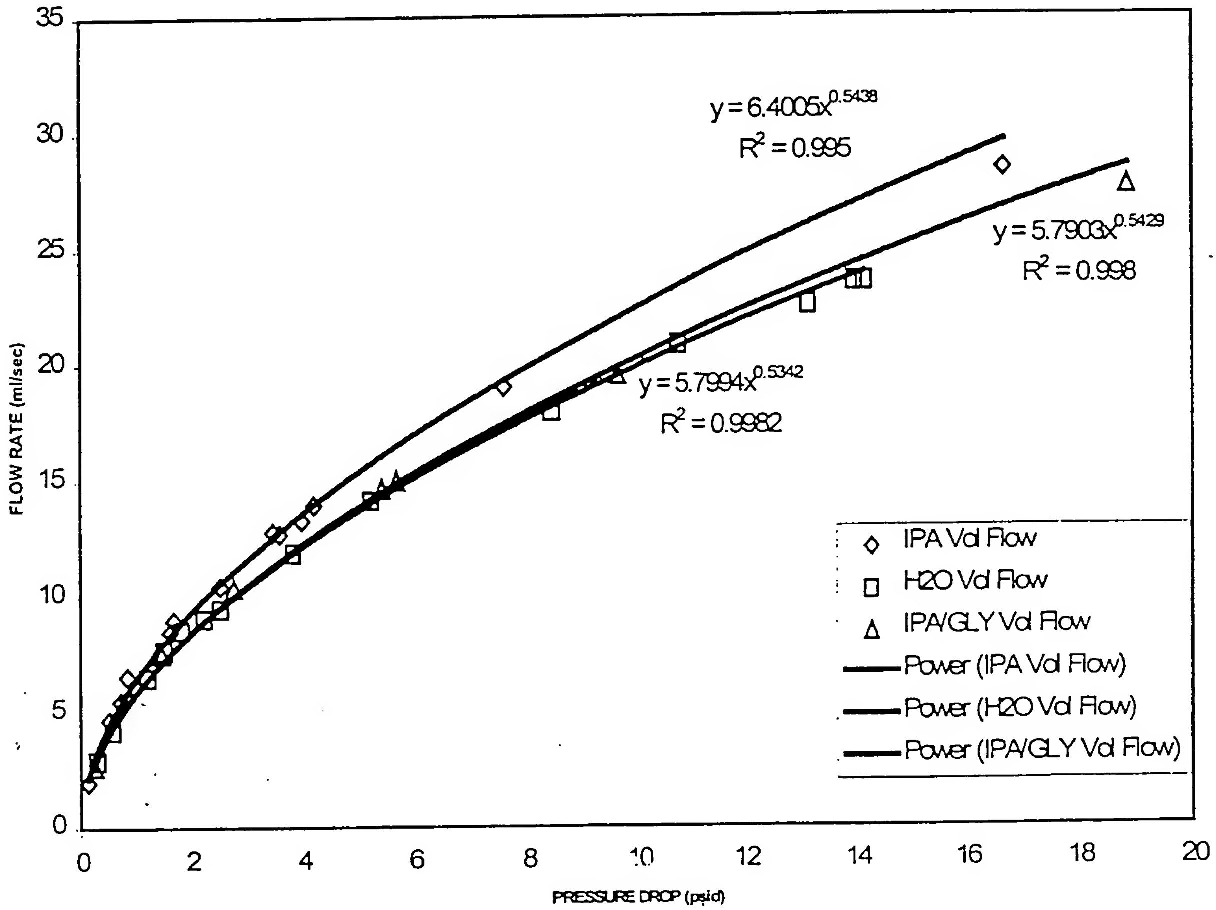

Figure 15

FLUTE 6UVT2 (1/4") VOLUMETRIC FLOWRATE vs $2_D P/_r$

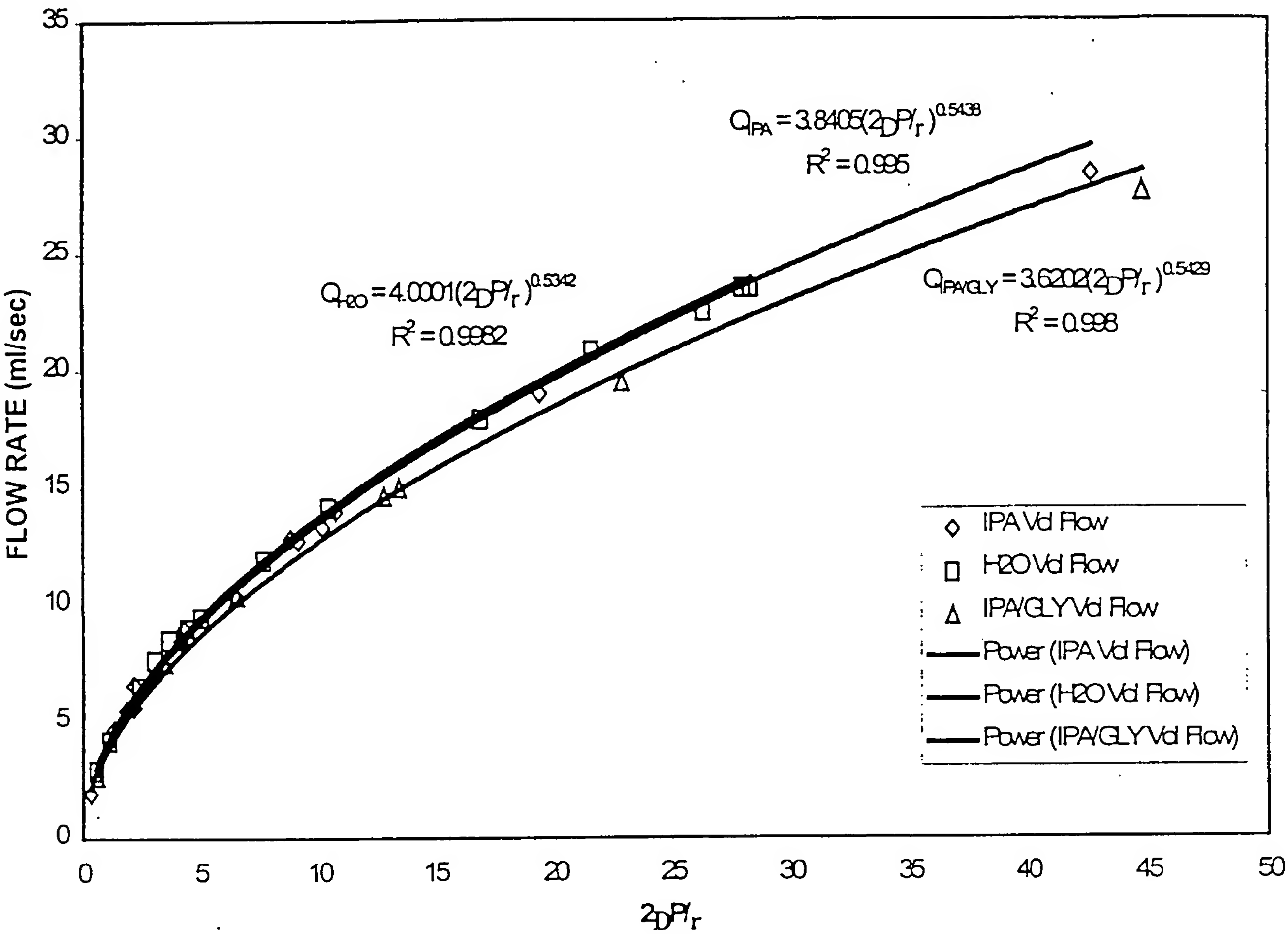

Figure 16

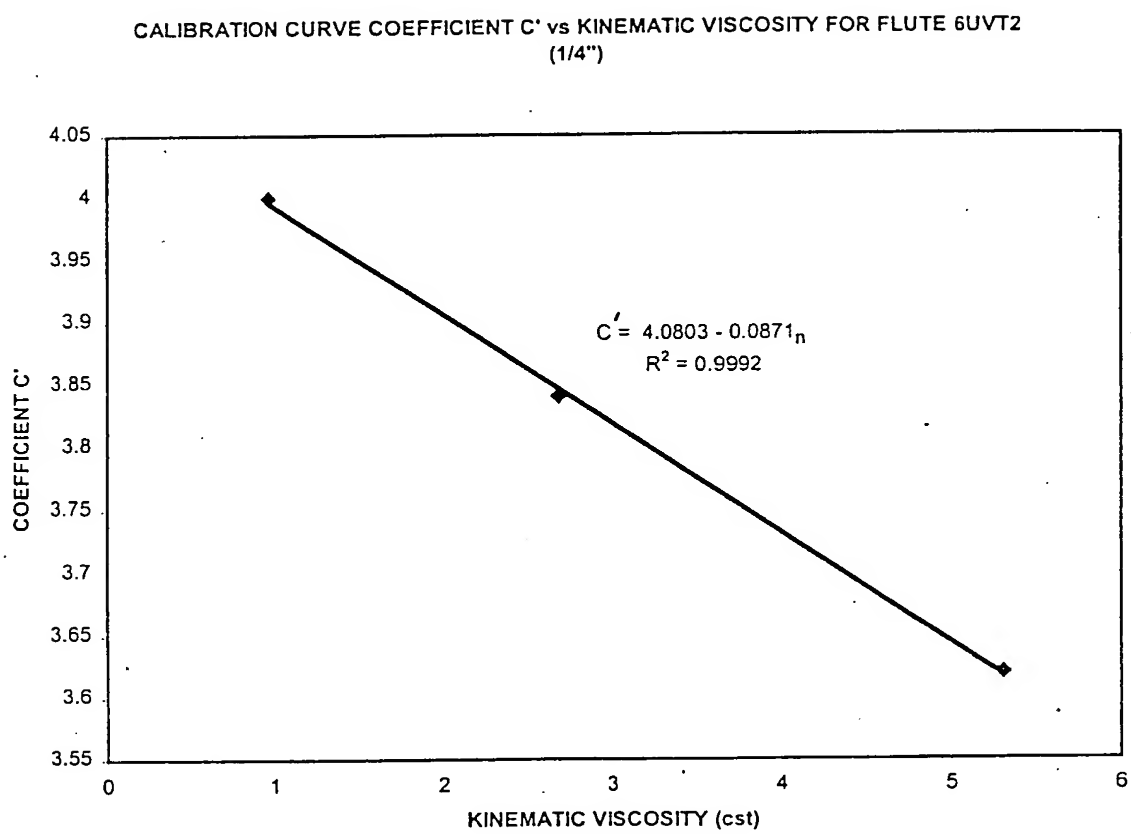
CALIBRATION CURVE COEFFICIENT C' vs KINEMATIC VISCOSITY FOR FLUTE 6UVT2 (1/4")
4.05
4
3.95
3.9
3.85
3.8
3.75
3.7
3.65
3.6
3.55
COEFFICIENT C'
C' = 4.0803 - 0.0871n
R2 = 0.9992
0
1
2
3
4
5
6
KINEMATIC VISCOSITY (cst)

Figure 17

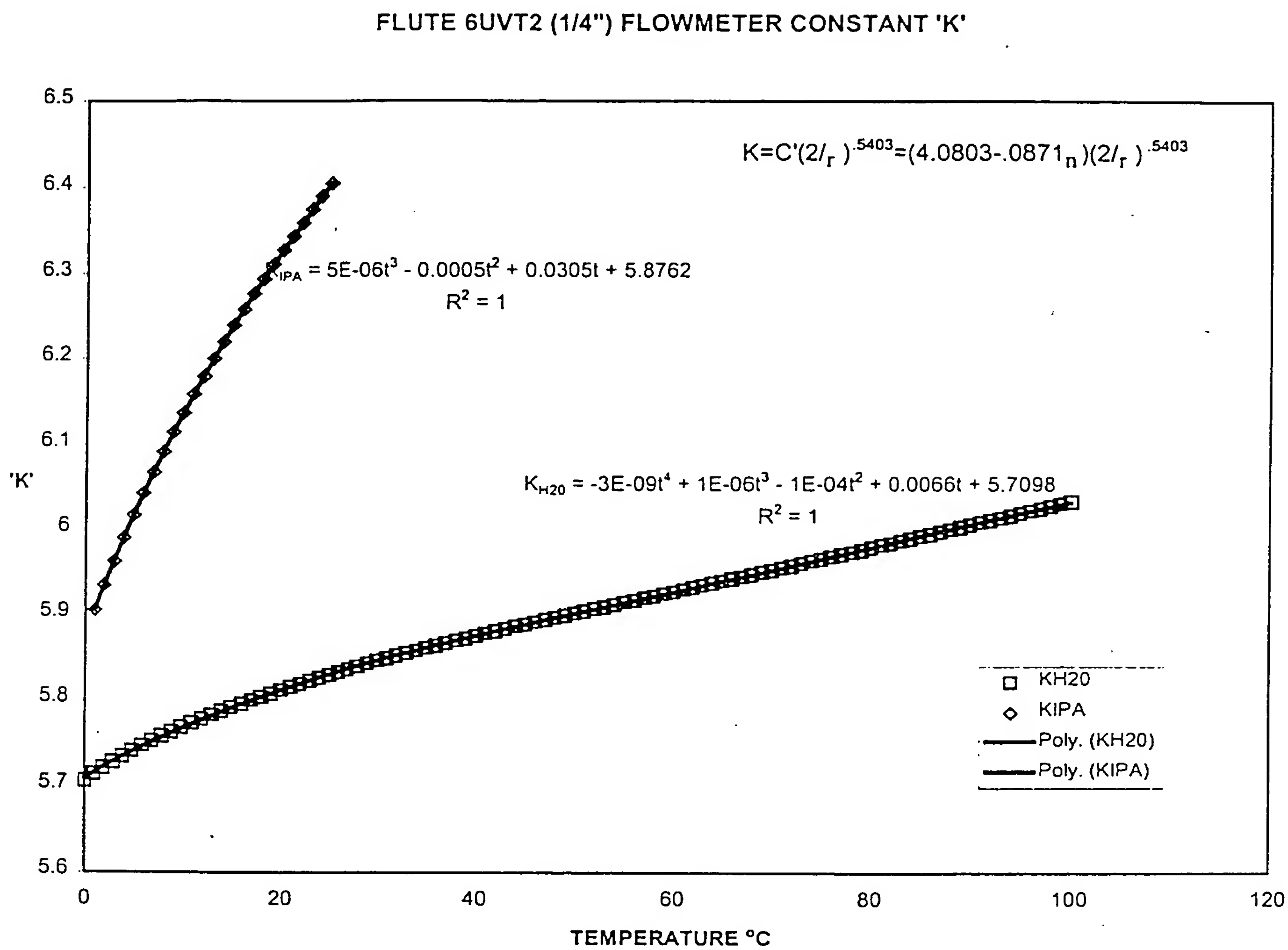
FLUTE 6UVT2 (1/4") FLOWMETER CONSTANT 'K'
K=C'(2/r)^.5403=(4.0803-.0871n)(2/r)^.5403
KIPA = 5E-06t³ - 0.0005t² + 0.0305t + 5.8762
R² = 1
KH20 = -3E-09t⁴ + 1E-06t³ - 1E-04t² + 0.0066t + 5.7098
R² = 1
KH20
KIPA
Poly. (KH20)
Poly. (KIPA)
'K'
6.5
6.4
6.3
6.2
6.1
6
5.9
5.8
5.7
5.6
0
20
40
60
80
100
120
TEMPERATURE °C

Figure 18

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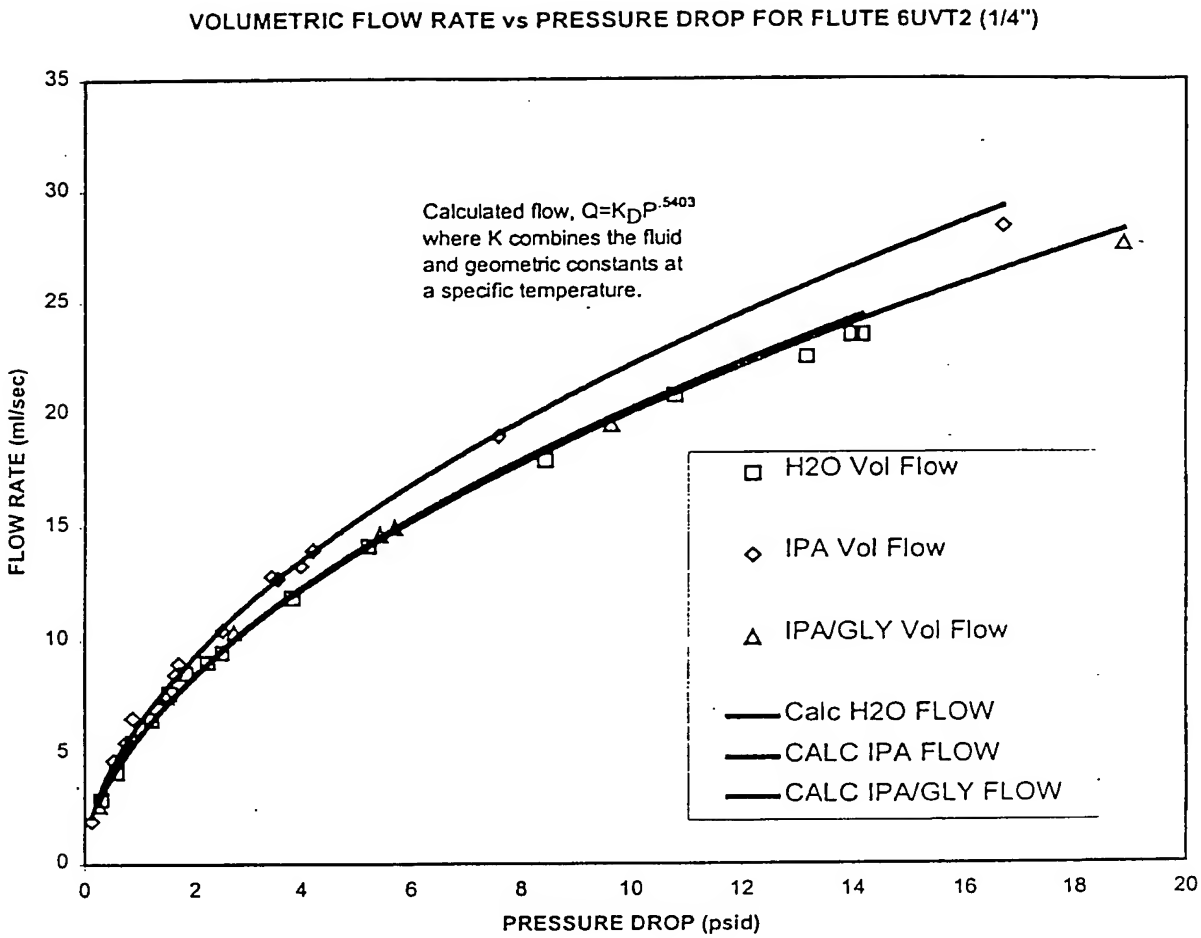

Figure 19

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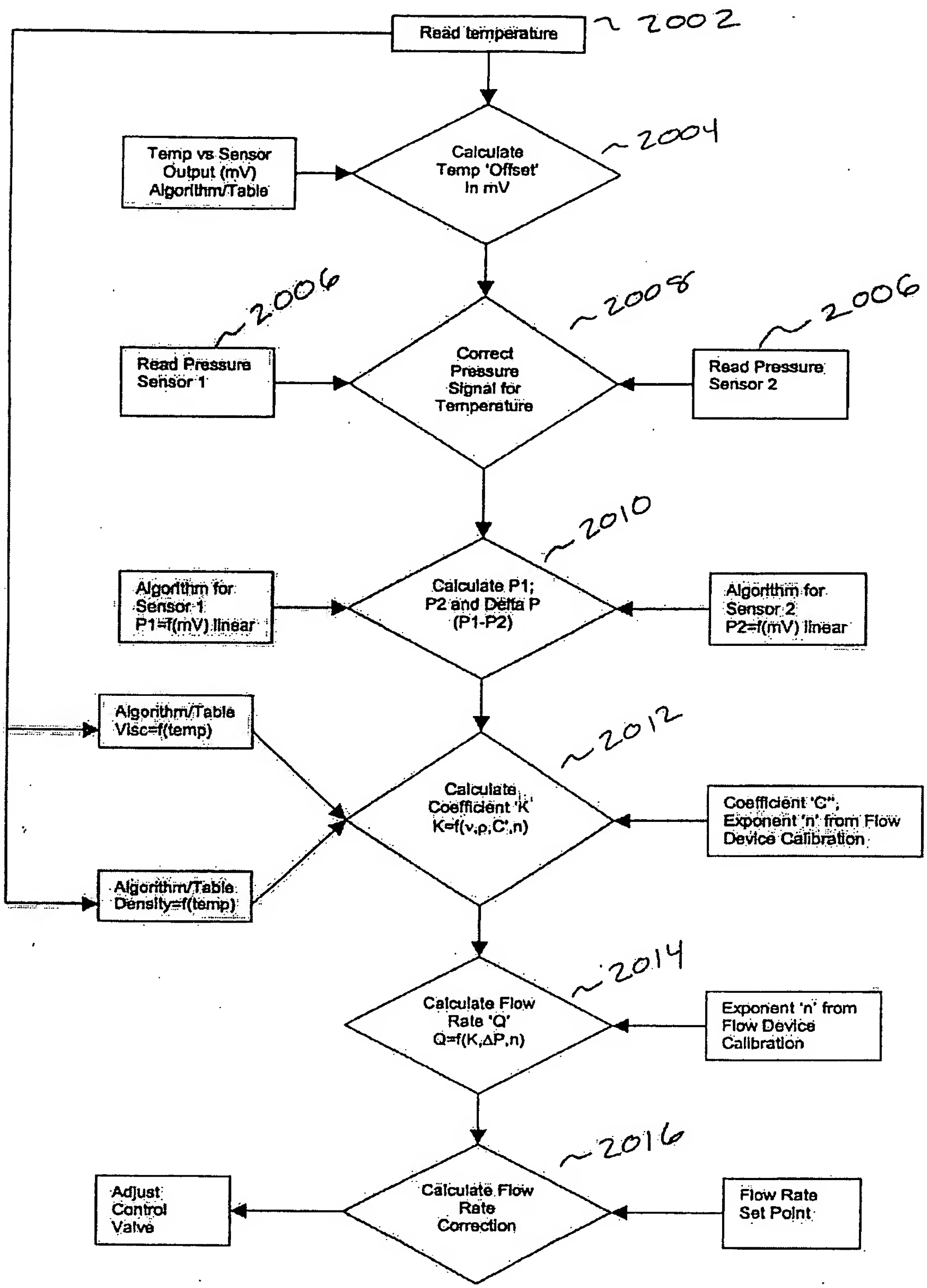

FIG 20

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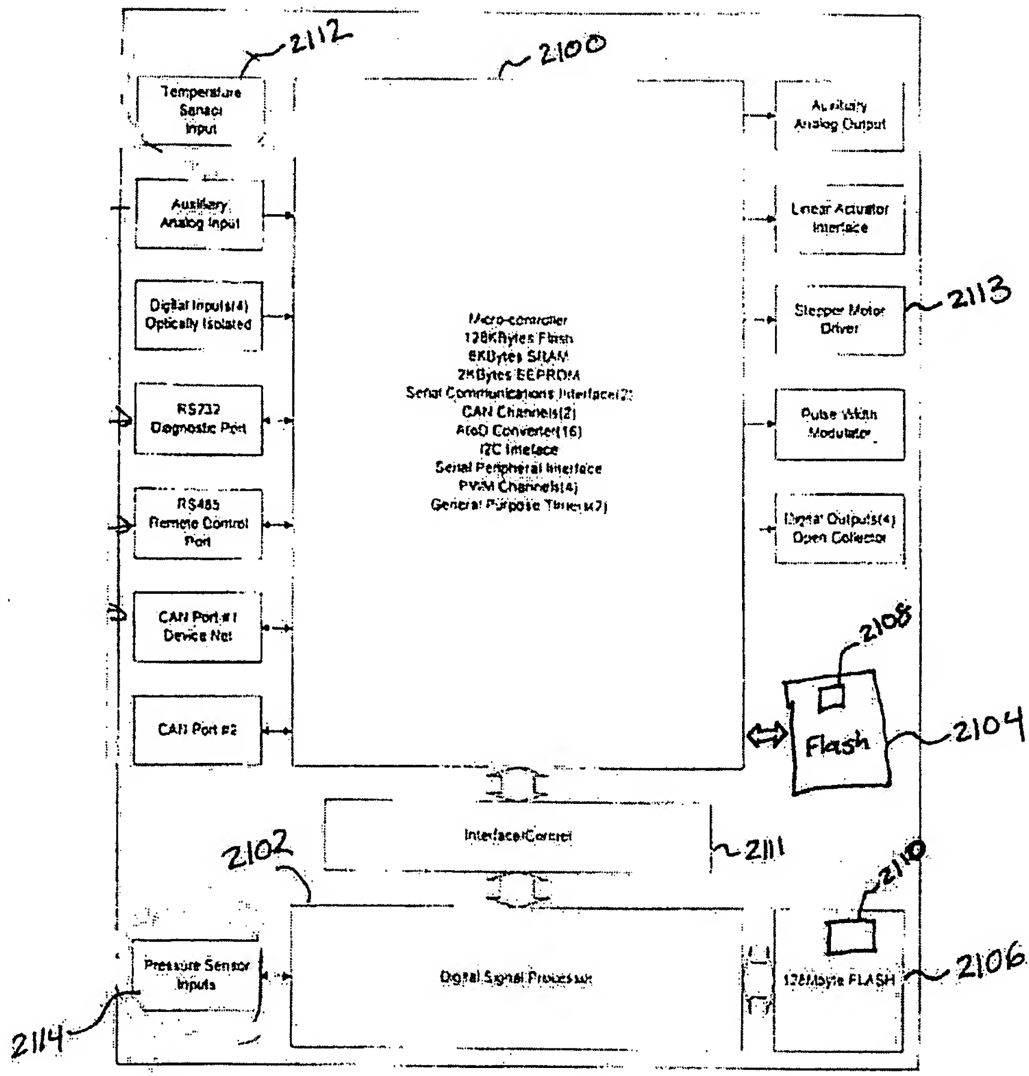

Figure 21

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As long as the fluid speed is sufficiently subsonic (V < mach 0.3), the incompressible Bernoulli's equation describes the flow. Applying this equation to a streamline traveling down the axis of the horizontal tube gives,

$$p_a - p_b = \Delta p = \frac{1}{2}\rho V_b^{\,2} - \frac{1}{2}\rho V_a^{\,2}$$

From continuity, the throat velocity V_b can be substituted out of the above equation to give,

$$\Delta p = \frac{1}{2}\rho V_a^{\,2}\left[\left(\frac{A_a}{A_b}\right)^2 - 1\right]$$

Solving for the upstream velocity V_a and multiplying by the cross-sectional area A_a gives the volumetric flowrate Q,

$$Q = \sqrt{\frac{2\Delta p}{\rho}}\,\frac{A_a}{\sqrt{\left(\frac{A_a}{A_b}\right)^2 - 1}}$$

Ideal, inviscid fluids would obey the above equation. The small amounts of energy converted into heat within viscous boundary layers tend to lower the actual velocity of real fluids somewhat. A **discharge coefficient** C is typically introduced to account for the viscosity of fluids,

$$Q = C\sqrt{\frac{2\Delta p}{\rho}}\,\frac{A_a}{\sqrt{\left(\frac{A_a}{A_b}\right)^2 - 1}}$$

Figure 22

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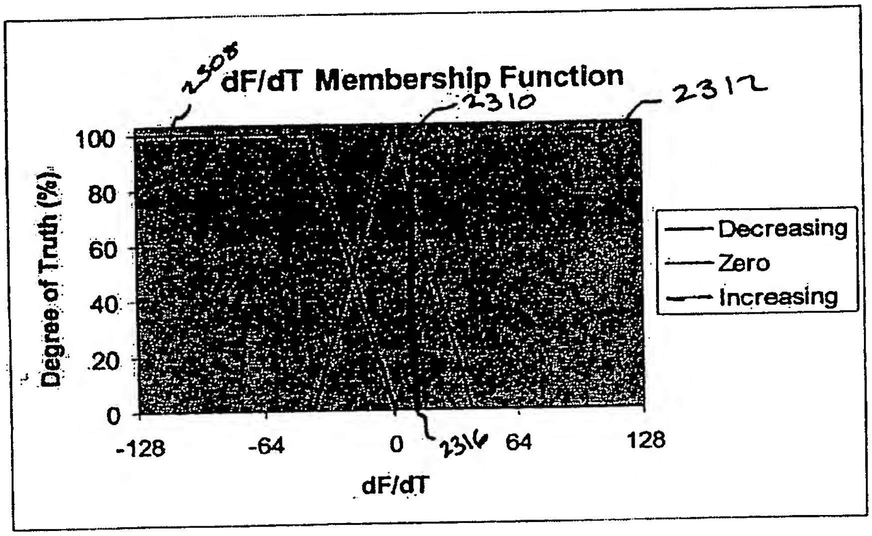

FIG 23B

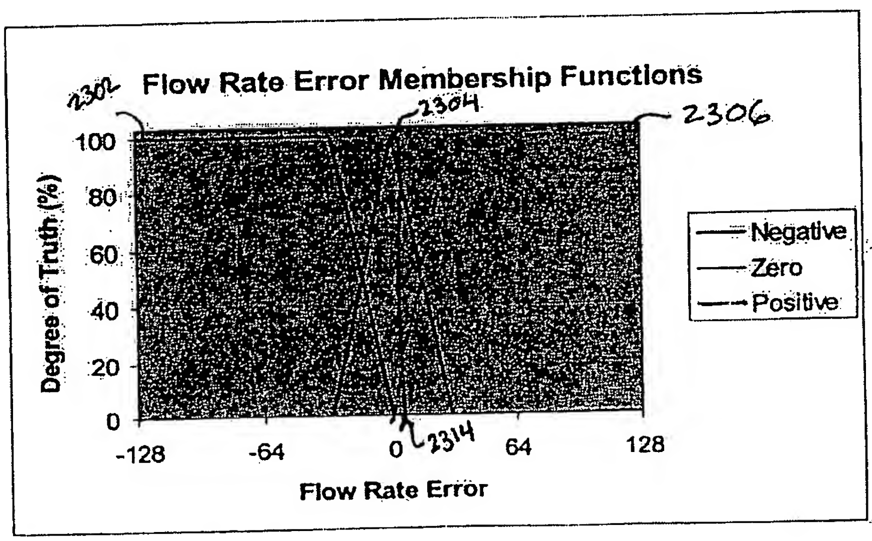

FIG 23A